

There is ample astronomical evidence that arrangements were made for observing the sun on May day both before and after the erection of the sarsens, and I think by this the truth of the tradition is strengthened.

Of the more recently published volume dealing with the bibliography of Stonehenge it may be said that no reference to Stonehenge by any ancient author, or any letter to the *Times* for the last twenty years dealing with any question touching the monuments, seems to be omitted from the bibliography. Thus, to give an instance, I find my old friend Sir Arthur Helps' work on "Spain's Conquest of America" referred to because in vol. iii. he treated of sun worship in Peru. The bibliography is not only to be commended for its thoroughness, but for its admirable method; it is a model of what such a work should be, and has evidently been a labour of love: Mr. Harrison acknowledges his obligations to the Birmingham Free Reference Library and the Bodleian, as well as to the Society's library at Devizes.

NORMAN LOCKYER.

#### STUDIES IN THE DISTRIBUTION OF PLANTS.

*Die Vegetation der Erde, Sammlung pflanzengeographischer Monographien.* Herausgegeben von A. Engler und O. Drude. (Leipzig: Verlag von W. Engelmann.)

1. *Grundzüge der Pflanzenverbreitung auf d. iberische Halbinsel.* Von Moritz Willkomm. Mit 21 Textfiguren, 2 Helio und 2 Karten (1896.)
2. *Grundzüge d. Pflanzenverbreit. i. d. Karpathen.* Von F. Pax. Mit 9 Textfiguren, 3 Helio und 1 Karte (1898.)
3. *Grundzüge d. Pflanzenverbreit. i. d. Kaukasusländern, von der unteren Wolga ueb. d. Manytsch-Schneider, bis z. Scheitelfläche Hocharmeniens.* Von Dr. Gustav Radde. Mit 13 Textfiguren, 7 Helio und 3 Karten (1899.)
4. *Die Vegetationsverhältnisse d. Illyrischen Länder.* Von Dr. Günther Ritter Beck v. Mannagetta. Mit 6 Vollbildern, 18 Textfiguren und 2 Karten (1901.)
5. *Die Heide Norddeutschlands.* Von P. Graebner. Mit einer Karte (1901.)

THE editors of the series of which the five volumes before us form the first instalment are to be congratulated no less on the courage with which they have embarked on a vast undertaking than on the success which has thus far attended their labours. The authors who have been severally entrusted with the floras of the different regions have been wisely selected, and are well qualified by special knowledge, extending in some cases over a considerable number of years, to grapple successfully with a task of no small difficulty and one which calls for the exercise of critical judgment of no mean order.

The general method of treatment is, in its broader outlines, tolerably uniform throughout the series, though of course there is considerable diversity in the treatment of details. A brief historical introduction in each case gives an account of the previous work done in a particular region, and this is followed by a discussion of

the physical characters and climate of the latter, in so far as these affect the nature of the vegetation and the distribution of the plants within the area. The floras themselves, though often containing rather lengthy lists of plants, are designed, in the first place, to give the reader a general picture of the vegetation as a whole, and also to enable him to trace its relations with the physical environment. For this purpose they are broken up into groups, characterised by the predominance of some particular tribe or assemblage of plants, *e.g.* the oak flora, the Mediterranean, the alpine, &c. In some cases, too, the cultivated plants are sufficiently described to give a fair impression of the chief features of the more inhabited regions. Perhaps the most generally interesting part of each book is that which deals with the affinities of the flora with the plants of foreign countries, and also the ecological peculiarities that are illustrated within the area of the several regions themselves.

The flora of Spain is discussed by Dr. Willkomm. It is one which is full of interest, not only from the large number of endemic species which it includes, but also for the great variety of *facies* which it exhibits. These characters are clearly traced in connection with the isolation, in the first place, of the peninsula itself, and, secondly, in the remarkable diversity of physical conditions which prevail within it.

The Carpathian flora, discussed by Prof. Pax, is one of remarkably mixed origin, but its affinities can be traced pretty definitely to a European source, on the one hand, and an Asiatic one on the other. Several forms from Siberia find a place here, but the greater number come from Asia Minor and do not extend farther into Europe. There is, of course, a fairly strong affinity with the flora of the Alps, whilst a Pyrenean element is also met with. The flora is thus rather a synthetic one, although there are a few endemic forms. The latter are, however, related to others occurring in the regions above named. In dealing with the flora of the lower slopes, the author deplores the mischievous effects of an imperfect acquaintance with the principles of forestry upon the woodlands, many of which are apparently suffering severely from ignorant treatment.

The volume is one which will appeal strongly to anyone who is interested in the broader problems of distribution and ecology, and it is a solid as well as a suggestive contribution to scientific literature.

Prof. Radde, in dealing with the plants of the Caucasus, describes the vegetation of the steppes to the north of the range, and his frequent journeys into these regions enable him to give a very fair impression of the appearance of these lands at different seasons of the year. The character of the vegetation of the higher altitudes of the Caucasus differs greatly on the two slopes, as might have been expected from the general trend of the mountains themselves. On the southern slope there is a great predominance of Persian plants, as shown by the abundance of species of *Astragalus*, *Acantholimon* and others. The prevailing character of the flora is markedly xerophytic, and it should be one which would repay further biological investigation.

The author distinguishes five principal zones, viz. the

steppes, woods, subalpine, alpine and high-alpine respectively, and these main subdivisions are broken up into smaller groups which exhibit some definite character by which they can be distinguished. A somewhat curious feature of the book rests in the inclusion of an account of the principal insect pests which are injurious to the cultivated plants.

The Illyrian flora, as described by Dr. Günther ritter Beck v. Mannagetta, is one which seems to be a promising, if difficult, field of exploration. The plants of the maritime regions are, for the most part, an extension of the typical Mediterranean vegetation; but in the higher levels, where the minimum temperature sinks below 14° C., it is succeeded by one of which the oaks form the characteristic feature. The swamp plants which occur in this zone consist, for the most part, of northern European forms, mixed with others of wide distribution. Still higher, the willows and pines form the distinctive land-marks, and these are finally succeeded by an alpine flora which varies in character in the different mountain groups. This is due largely to difference in geological character, and partly also to the isolation of the mountains themselves. The volume includes a short sketch of the Algæ of the Adriatic coast, and ends with a discussion as to the relationships of the Illyrian flora with that of the surrounding countries, especially with regard to the physical changes which have occurred since Tertiary times.

The last, but by no means the least interesting, volume, by Dr. Graebner, deals with a more restricted formation, but this very circumstance affords an opportunity for a more detailed treatment. The heath and moorland vegetation is one which fairly bristles with interesting problems, and the volume in question forms a useful contribution to the whole subject. Here and there, perhaps, the chemical aspects of the relation between plant and soil preponderate over the hardly less important biological ones. The author corrects a common error as to the relation between the heather and a limestone soil. He shows that the destruction of the heather, or its non-appearance, is not due to the presence of the calcium salts directly, for he proves by experiment that in a sufficiently poor soil lime may be added in quantity without any injury to the plants in question. But a natural limestone soil is commonly also rich in other mineral constituents which are available for food manufacture, and it is to the presence of these that its absence or extermination is due. Heather is, in fact, very sensitive to manure, which causes its disappearance from soils which may have been previously infested by it.

It is, of course, quite impossible to do justice to the books under consideration within the limits of a short notice such as the present, but it is hoped that enough has been said to indicate their importance in helping to fill a serious gap in botanical literature.

It may be fairly said, moreover, that each volume will be quite indispensable to anybody who may desire to make a close acquaintance with the scientific aspects of the floras of the regions thus severally dealt with. And, taken collectively, they render it possible to acquire a far more intelligent grasp of the facts, and therefore also of the problems, of plant distribution and ecology than has hitherto been practicable for most of us.

#### OUR BOOK SHELF.

##### *La Question de l'Eau potable devant les Municipalités.*

By P. Guichard. Pp. 190. "Encyclopédie Scientifique des Aide-Mémoire." (Paris: Gauthier-Villars, n.d.) Price fr. 3.

IN this work the author has brought together accounts of the water supplies of some twenty-six towns of France, giving details, as far as possible, of the source from which the water is derived in each case, of the treatment to which it is subjected before distribution and of its chemical and bacteriological character. These accounts are derived from analyses and reports furnished by the various analysts who have actually examined the supplies, and are of very varying degrees of completeness. The object which the author had in view in making his inquiries was to ascertain what method of purification, if any, was usually employed by the municipality to ensure the freedom of the water from the germs of disease. The answer to this question is that the municipalities select the best water at their disposal and deliver it to the consumers either without any treatment or after filtration through sand, Anderson's iron process being used in a few cases. The author does not regard sand-filtration as by any means a satisfactory method of purification, in spite of the fact that experiments have shown that when properly carried out it is extremely efficacious, and that the comparative freedom from water-borne disease of towns like London, which make use of water known to be polluted, depends entirely on its use. No discussion of this or kindred points is given, and this somewhat detracts from the value of the book. After pointing out the numerous sources of contamination which may affect the water of towns both before collection and during distribution, the author recommends all householders to protect themselves by purifying all water in their own houses by filtration or other means, and believes that only in this way can security be attained. A very proper and timely protest is made against the continued use of cemeteries for burying those who have died of infectious diseases, and also against the fashionable institution of cemeteries for pet animals, the infiltrations from all of which pass into the streams and rivers of the district, so that, as the author expresses it, "nous mangeons ou buvons de l'homme et du chien à une sauce non prévue dans les traités de gastronomie."

##### *Plissements et Dislocations de l'écorce terrestre en Grèce*

By Ph. Negris. Pp. 210; 2 maps. (Athens: C. Beck; Paris: C. Béranger, 1901.)

THE large questions raised by the author cannot be adequately discussed in a brief notice, so it must suffice to state his main facts and inferences, expressing doubts in passing. Since Jurassic times, successive earth-movements have affected Greece and the adjacent parts of Turkey. The foldings produced are distinguished by local names. The earliest, or Olympic, which is pre-Cretaceous, runs from N.W. to S.E. along the eastern coast and a chain of islands as far as Karpalho. The Pentelic, closing that period, is at right-angles to it and acts more especially on the Ægean area, its western coasts and the Morea. The Achaic, which occurred during the Eocene, more or less affects the whole region and even Crete, running W.N.W. to E.S.E. The Pindic, closing the Eocene, trends in a N.N.W.-S.S.E. direction and can be traced in the Pindus mountains, the country to the west and the Morea. Last is the Tenarus folding, which began late in the Pliocene and affected the whole of the Greek kingdom, running from N. to S. All are generally associated with outbursts of igneous rock—peridotite (serpentine) in the earlier, trachyte in the later. There are also three important sets of faults, on which, however, we cannot dwell. The Tenarus folding pro-